```
(FILE 'HOME' ENTERED AT 11:15:47 ON 18 DEC 1999)
    FILE 'REGISTRY' ENTERED AT 11:15:52 ON 18 DEC 1999
             97 (0<CU<5 AND 0<MG<6 AND 0<LI<1 AND 50<AL)/MAC
L1
     FILE 'HCA' ENTERED AT 11:16:30 ON 18 DEC 1999
          4476 (ALUMINUM OR AL) AND (COPPER OR CU) AND (LITHIUM OR LI) AND
            130 Ll
L2
L3
(MA
             63 L2 AND L3
L4
                SELECT L4 1- IPC
         371029 E1-E28
L5
            504 L5 AND L3
              0 (ALUMINUM RO AL) (1A) (BASE? OR ALLOY OR BALANC? OR REMAIN? OR
L6
L7
         125719 (ALUMINUM OR AL) (1A) (BASE? OR ALLOY OR BALANC? OR REMAIN? OR
RE
L8
RE
            328 L6 AND L8
            206 L9 AND (CR OR V OR TI OR ZR) AND (MN OR NI OR FE OR HF)
L9
L10
            181 L10 NOT L4
L11
            165 L11 AND (ZN OR AG OR SI)
L12
                E RIOJA ROBERTO/IN, AU
             14 E5-6
L13
                E STALEY JAMES/IN, AU
             35 E8-E9
L14
                E BRAY GARY/AU, IN
              9 E5-E7
L15
             56 L13 OR L14 OR L15
            17 L16 AND L8 AND (CR OR V OR TI OR ZR) AND (MN OR NI OR FE OR
L16
L17
HF)
             10 L17 NOT (L4 OR L12)
L18
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131:160372 HCA
ΑN
     High-strength aluminum-magnesium alloys for
ΤI
     application in welded construction
     Haszler, Alfred Johann Peter; Sampath, Desikan
     Hoogovens Aluminium Walzprodukte G.m.b.H., Germany
ΙN
PΑ
     PCT Int. Appl., 20 pp.
so
     CODEN: PIXXD2
     Patent
DT
     English
LA
FAN.CNT 1
                                              APPLICATION NO.
                                                                DATE
                       KIND DATE
     PATENT NO.
                                              -----
                              _____
                                                                19990218
                                              WO 1999-EP1011
                              19990826
          W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE,
     WO 9942627
PΙ
              DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
              KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW,
              MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ,
          RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI,
MT
              CM, GA, GN, GW, ML, MR, NE, SN, TD, TG
                       19980220
 PRAI EP 1998-200560
      The Al-Mg alloys suitable for extrusions or rolled
      strip contain Mg >3.0 to 4.5 (esp. 3.5-4.5), Mn 0.4-1.2, Zn
      0.4-1.7, Zr 0.05-0.25, Cr .ltoreq.0.3, Ti .ltoreq.0.2, V .ltoreq.0.2,
      Li .ltoreq.0.5, Sc .ltoreq.0.5, Fe .ltoreq.0.5, Si .ltoreq.0.5,
      Cu .ltoreq.0.15, and Ag .ltoreq.0.4% with impurities .ltoreq.0.05
      each and .ltoreq.0.15% total. The Al-Mg alloy is
      suitable for manuf. of high-strength containers or welded structural
      parts, esp. for operation near 80-100.degree.. The alloy ingot is
      typically preheated at 300-530.degree. to decrease segregation, hot
      rolled, and optionally finished by cold rolling, and the resulting strip
      is heat treated for high-strength applications and corrosion resistance.
      The typical alloy for manuf. of the strip 1.2 mm thick with longitudinal
      tensile strength of 292 MPa contains Mg 3.9, Mn 0.74, Zn 0.53,
       Zr 0.13, Cr 0.05, Ti 0.02, Fe 0.31, Si 0.14, and Cu 0.05%. The
       alloy strength and ductility are comparable to those of the low-Zn AA
       Al-alloy strip susceptible to sensitized and intergranular
 5083
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corrosion.

Aluminum alloys for extrusion and their production method ΑN including casting process with element addition ΤI Kikuchi, Masao; Saga, Makoto IN Nippon Steel Corp., Japan Jpn. Kokai Tokkyo Koho, 13 pp. SO CODEN: JKXXAF Patent DT Japanese T.A APPLICATION NO. DATE FAN.CNT 1 KIND DATE -----PATENT NO. ____ 19970828 -----JP 1997-232545 JP 11061312 A2 19990305 The Al alloys contain Si .ltoreq.1.2, Fe .ltoreq.1.5, Cu PΙ .ltoreq.0.50, Mn .ltoreq.1.5, Mg 2.0-8.0, Cr .ltoreq.0.35, Zn .ltoreq.0.50, and Ti .ltoreq.0.20% and have no. of crystals having max. AΒ diam. .gtoreq.40 .mu.m .ltoreq.200/mm2 in cross section of billets for extrusion and no. of crystals having ratio of (max. diam)/(min. diam.) .gtoreq.5.0 .ltoreq.100/mm2. Alternatively, the alloys contain (a) 0.2-1.5% each of Si and Mg or (b) Cu .ltoreq.3.0, Mg 0.2-3.0, and Zn 1.0-8.0% instead of the above ratio of each element. In the manuf. of the alloys by melting, casting, and soaking to form billets, 0.005-0.3% in total of Na, Sr, Sb, Ca, Te, Ba, Li, K, Bi, P, As, and/or Se is added during the casting process. The alloys have good extrusion property, mech. properties, corrosion resistance, and secondary workability even though they are manufid. by recycling scraps as

raw materials.

130:240657 HCA Aluminum alloy strips and their production for automobile body AN ΤI panels Kikuchi, Masao; Takada, Takeshi IN Nippon Steel Corp., Japan PΑ Jpn. Kokai Tokkyo Koho, 7 pp. so CODEN: JKXXAF Patent DTJapanese LA FAN.CNT 1 APPLICATION NO. DATE KIND DATE PATENT NO. _____ -----_____ JP 1997-232526 19970828 JP 11061311 A2 19990305 ΡI The Al alloy strips contain Si .ltoreq.1.2, Fe .ltoreq.1.5, ΑB Cu .ltoreq.0.50, Mn .ltoreq.0.80, Mg 2.0-8.0, Cr .ltoreq.0.35, Zn .ltoreq.0.50, and Ti .ltoreq.0.20% and have no. of crystals having max. diam. .gtoreq.10 .mu.m .ltoreq.300/mm2 in cross section of rolling direction and no. of crystals having ratio of (max. diam)/(min. diam.) .gtoreq.3.5 .ltoreq.100/mm2. In the manuf. of the alloy strips, 0.005-0.3% in total of Na, Sr, Sb, Ca, Te, Ba, Li, K, Bi, P, As, and/or Se is added during casting process. The strips have improved moldability and corrosion resistance even though they are

by recycling scraps as raw materials.

manufd.

Examines & Com

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AN 104:23136 HCA
      Aluminum-lithium alloys
      Sawtell, Ralph R.; Bretz, Philip E.; Hunt, Warren H.
      Aluminum Co. of America, USA
 PA
      Eur. Pat. Appl., 23 pp.
 SO
      CODEN: EPXXDW
 DT
      Patent
 LΑ
      English
 FAN.CNT 8
      PATENT NO.
                     KIND DATE
                                         APPLICATION NO. DATE
                     ----
                           -----
                                         -----
     EP 157600
 ΡI
                      A2
                           19851009
                                         EP 1985-302169
     EP 157600
                                                          19850328
                      AЗ
                           19870916
     EP 157600
                     B1
                           19920701
         R: CH, DE, FR, GB, IT, LI, NL, SE
     US 4648913
                  A 19870310
                                         US 1984-594344
     AU 8538094
                                                         19840329
                      A1
                         19851003
                                         AU 1985-38094
     AU 573683
                                                         19850125
                     B2 19880616
     CA 1228490
                     A1 19871027
                                        CA 1985-475903
     NO 8501267
                                                         19850307
                     A 19850930
                                        NO 1985-1267
     BR 8501422
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                     Α
                          19851126
                                        BR 1985-1422
     JP 60221543
                                                         19850328
                     A2 19851106
                                        JP 1985-66407
     US 4897126
                                                         19850329
                     A
                         19900130
                                        US 1988-213722
     US 5135713
                                                         19880630
                     A
                          19920804
                                        US 1990-588410
PRAI US 1984-594344
                    19840329
                                                         19900926
    US 1984-685731
                    19841224
    US 1988-149802
                    19880128
    US 1988-172506
                    19880324
    High toughness in combination with tensile strength is obtained in
AB
    aircraft alloys contg. Li 0.5-4, Mg 0-5.0, Cu
    0-5.0, Zr 0-1.0, Mn 0-2.0, Zn 0-7, Fe <0.5, and Si <0.5%. The wrought
bar
    or strip is soln.-treated, quenched, stretched >3%, and aged at
```

or strip is soln.-treated, quenched, stretched >3%, and aged at 150-400.degree.F. Tensile strength of 50-85 kpsi is typically achieved with fracture toughness 25-75 kpsi-in0.5. Thus, Al alloy ingot contg. Li 1.73, Cu 2.63, and Zr 0.12% was homogenized 24 h at 1000.degree.F, and hot-rolled into plates 1 in. thick. The plate was soln. heat treated 1 h at 1025.degree.F, quenched in water at 70.degree.F, stretched 2 or 6%, and aged at 325 or 375.degree.F. Tensile strength and fracture toughness were higher after stretching to 6%, compared with 2%.

Elamine Con

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ΑN
    107:119640 HCA
    Aluminum-lithium alloys and method of making the same
ΤI
IN
    Cho, Chul Won
    Aluminum Co. of America, USA
    PCT Int. Appl., 46 pp.
    CODEN: PIXXD2
DT
     Patent
LΑ
    English
FAN.CNT 8
                                         APPLICATION NO.
                                                           DATE
     PATENT NO.
                     KIND DATE
     _____
                     ____
                           -----
                                                           19861119
    WO 8703011
                     A1
                           19870521
                                          WO 1986-US2545
PΙ
        W: AU, BR, JP, NO
        RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE
   Sus 4806174
                                          US 1985-793273
                                                           19851119
                    A
                           19890221
    AU 8768381
                      A1
                                          AU 1987-68381
                                                           19861119
                           19870602
    BR 8606987
                                          BR 1986-6987
                                                           19861119
                      Α
                           19871201
                                          EP 1987-900418
                                                           19861119
    EP 247181
                      A1
                           19871202
    EP 247181
                      В1
                           19911002
        R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE
                                          JP 1987-500396
                                                           19861119
                      T2
                           19880728
     JP 63501883
     CA 1283565
                      A1
                           19910430
                                          CA 1986-523324
                                                           19861119
    NO 8702996
                      Α
                           19870917
                                         NO 1987-2996
                                                           19870717
PRAI US 1985-793273
                     19851119
    US 1984-594344
                     19840329
                     19861119
    WO 1986-US2545
    The low-d. alloys suitable for aircraft applications contain Li
AB
     0.5-4.0, Mg 0-5.0, Cu <5.0, Zr 0-1.0, Mn 0-2.0, Zn
     0-7.0, and Fe and Si .ltoreq.0.5% each. A wrought product having an
     isotropic texture is manufd. by hot working into a preform without a
     dissoln. loss of grain-boundary ppts., followed by recrystn. of the
    preform and hot working for final shaping. The alloy is suitable for
     sheet manuf. and pptn. hardening. Thus, a cast ingot of Al
     alloy (contg. Li 1.73, Cu 2.63, and Zr 0.12%) was
     soaked 24 h at 1000.degree. F, and then hot-rolled into a plate
     (.apprx.0.25 in). The plate was soln.-treated 1 h at 1075.degree. F,
     quenched in water to 70.degree. F, and stretched for 2 or 6% elongation.
     Plate specimens were then heat-treated at 325 or 375.degree. F for
     artificial aging. Fracture toughness and tensile strength were improved
    more by stretch-forming for 6% than for 2%.
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Examples Cops

```
AN
     110:139903 HCA
     Aluminum-lithium alloy for flat-rolled product
TТ
     Young, Kenton P.; Bowers, Joel A.; Colvin, Edward L.; Westerlund, Robert
IN
     Α.
PA
     Aluminum Co. of America, USA
     Eur. Pat. Appl., 6 pp.
so
     CODEN: EPXXDW
DT
     Patent
LA
     English
FAN.CNT 1
                      KIND DATE
                                            APPLICATION NO. DATE
     PATENT NO.
                            _____
                                            _____
                     A1 19880907
B1 19920520
     EP 281076
                            19880907
                                           EP 1988-103080
                                                             19880301
PΙ
     EP 281076
       R; CH, DE, ES, FR, GB, IT, LI, NL, SE
    US 4790884
                   A 19881213
                                           US 1987-20600
                                                              19870302
     CA 1308630
                       A1
                            19921013
                                           CA 1988-560077
                                                              19880229
     JP 63235454
                       A2
                            19880930
                                           JP 1988-49453
                                                              19880302
                                           BR 1988-903
     BR 8800903
                       Α
                            19881011
                                                              19880302
                    19870302
PRAI US 1987-20600
     The Al-Li alloys for sheets or plates showing a good
     formability without Luder's line defect contain Li 0.5-4.0,
     Cu and Mg .ltoreq.5.0 each, Zr .ltoreq.1.0, Mn
     .ltoreq.2.0, Zn .ltoreq.7.0, Fe and Si .ltoreq.0.5% each, and preferably
     .ltoreq.0.35% impurities. A flat-rolled product is soln. heat treated
and
     quenched; preaged at 150-270.degree.F for >6 h; stretched without forming
     the Luder's line defect; and then aged to stabilize mech. properties.
     Thus, cast alloy ingot (contg. Li 2.3, Cu 2.7, and Zr
     0.1%) was heated for 24 h at 1000.degree. F for homogenizing, hot-rolled
to
     0.162 in. thickness, cut, and cold-rolled into strips 0.063 in. thick.
     The strips were heated for 60 min at 1020.degree.F, quenched in water,
     preaged at 230.degree.F for 100 h, and cooled in air. The strips were then stretched 1% without showing the Luder's line defect. Without the
     preaging treatment the stretched strips showed the defect.
```

Examples Cop

```
ΑN
     116:260506 HCA
     Two-step aging of aluminum-lithium alloys
TI
     Rioja, Roberto J.; James, R. Steve
IN
     Aluminum Co. of America, USA
     U.S., 10 pp.
     CODEN: USXXAM
DT
     Patent
     English
LA
FAN.CNT 1
                                          APPLICATION NO. DATE
                 KIND DATE
     PATENT NO.
PI US 5076859 A 19911231
                                          _____
                                       US 1989-457099
                                                           19891226
                           19911231
     The soln. treated articles from Al-Li alloys are aged
     in the 1st stage for 0.1\text{--}100~h at 250\text{--}415 .degree.F, and then in the 2nd
     stage (esp. for 1-1000 h) at 100-330 .degree. F for improved strength and
     fracture toughness. The heat treatment process is suitable for the
     Al alloys contg.: (a) Li 0.2-5.0, Mg 0-5.0,
     Cu .ltoreq. 5.0, Ag 0-2, Zr 0-1.0, Mn 0-1.0, Zn 0-9.0, Fe .ltoreq.
     0.5, and/or Si .ltoreq. 0.5%; or (b) Li 0.5-4.0, Mg
     0.1-6.0, cu .gtoreq. 0.6, Zn 0.05-12, Mn 0-0.8, Zr .ltoreq.
     0.15, Ag 0.05-1, Fe .ltoreq. 0.5, and/or Si .ltoreq. 0.5%. Thus, the
     strip specimens from AA 2090 alloy were aged at 300-310 .degree.F and
then
     at 212-250 .degree.F, and showed high fracture toughness insensitive to
     the tensile yield strength of 72-80 kpsi. When the alloy was aged only
at.
     325 .degree.F, the fracture toughness decreased with the higher yield
     strength of 70-77 kpsi.
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Caminer's Copy

AN124:295966 HCA Crystallography of heterogeneous S' & T1 precipitates in double aged TΙ ΑU Oezbilen, Sedat Teknik Egitim Fakultesi, Gazi Univ., Ankara, Turk. CS Turk. J. Eng. Environ. Sci. (1996), 20(2), 103-12 CODEN: TJESEC; ISSN: 1300-0160 DTJournal LΑ Turkish Alloys prepd. with a chem. compn. of A1-2.11%cu-0.93%AΒ Mg (alloy-1) and A1-2.07%Cu-0.97%Mg -0.87% Li (alloy-2) were subjected to homogenization, water-quenching, natural aging for 3.15 .times. 107s & artificial aging аt 463K for 2.16 .times. 104s & 8.64 .times. 104s (double aging). Selected samples were examd. in detail under TEM. For this purpose, bright & dark field images together with electron diffraction patterns taken from [001], [011], [012] & [111]Al-matrix directions were used. It was obsd. that there was an effect of alloying elements, namely Li, Cu , $\mathbf{M}\mathbf{g}$ on the nature & d. of lattice defects of dislocation loop type in Al-matrix during heat treatments. In alloy-2, Li & Cu atoms segregating on Frank & double-arc contrast, prismatic loops cause the formation of T1 (Al2CuLi) ppts. during double aging; in alloys-1 & 2, **Cu & Mg** atoms segregating on unfaulted & orthorhombic, prismatic dislocation loops cause the formation of heterogeneous S' (Al2CuMg) ppts. on these dislocation loops during the same heat treatment.

Examines: Gorg

```
AΝ
    118:85846 HCA
ТT
    Aluminum-lithium-zinc alloys for extruded parts having
    a low aspect ratio
    Witters, Jeffrey J.; Cheney, Brian A.; Rioja, Roberto J.
IN
    Aluminum Co. of America, USA
PΑ
    PCT Int. Appl., 21 pp.
SO
    CODEN: PIXXD2
    Patent
DТ
    English
LA
FAN.CNT 1
                   KIND DATE
                                        APPLICATION NO. DATE
    PATENT NO.
     _____
                                          _____
                                         WO 1991-US9808 19911227
                    Al 19920723
PΙ
    WO 9212269
        W: JP
        RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE
                                    us 1990-634901 19901227
    US 5151136 A 19920929
                                                          19911227
                          19921216
                                         EP 1992-902697
    EP 517884
                     Α1
        R: DE, FR, GB
                                         JP 1992-502886 19911227
    JP 05505854
                     Т2
                         19930826
                    19901227
PRAI US 1990-634901
    WO 1991-US9808
                    19911227
    The Al alloys having extruded length/thickness ratio of 1-2.5
AB
    contain Li 0.2-5.0 and Zn 0.05-12.0 (esp. 0.05-13) with
    Mg 0-5.0, Cu .ltoreq.6.5, Zr .ltoreq.1.0 Mn .ltoreq.2.0,
    Aq .ltoreq.2, Fe .ltoreq.0.5, and/or Si .ltoreq.0.5%. The preferred
allov
    contains Li 1.5-3.0, Cu 2.55-2.90, Mg
    0.2-2.5, Zn 0.2-11.0, Zr 0.08-0.12, \overline{\text{Mn}} 0-1.0, and Fe and Si impurities
     .ltoreq.0.1% each. The alloys optionally contain Cr, V, Sc, and/or Ti at
    0.05-0.2, and/or Hf, Fe, Ni, Ag, and/or Mn at 0.05-0.6%. The starting
    alloy ingot can be preformed with .gtoreq.30% size redn., followed by
heat
    treatment for 1-50 h at 400-1200.degree. prior to the extrusion stage.
    Tensile yield strength of the extrusions is .gtoreq.60 kpsi. Thus, the
    extruded billet was manufd. from the alloy contg. Li 2.17,
    {\tt Cu} 2.79, {\tt Zn} 0.49, {\tt Mg} 0.25, {\tt Zr} 0.07, {\tt Mn} 0.35, and {\tt V}
    0.08%. After thermomech. treatment and final aging (30 h at 310
    .degree.F), tensile strength was 78 kpsi, yield point 71.2 kpsi, and
    elongation 6.8%. Com. AA 2091 Al alloy after the same
    processing showed 70 kpsi, 69.4 kpsi, and 1.6% resp.
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```
110:139903 HCA
AN
    Aluminum-lithium alloy for flat-rolled product
    Young, Kenton P.; Bowers, Joel A.; Colvin, Edward L.; Westerlund, Robert
TΙ
ΙN
    Aluminum Co. of America, USA
PΑ
    Eur. Pat. Appl., 6 pp.
SO
    CODEN: EPXXDW
    Patent
DT
   English
LA
                                        APPLICATION NO. DATE
FAN.CNT 1
     PATENT NO. KIND DATE
                                         _____
                     ----
                                         EP 1988-103080 19880301
     -----
    EP 281076 A1 19880907
EP 281076 B1 19920520
       R: CH, DE, ES, FR, GB, IT, LI, NL, SE
   US 4790884 A 19881213 US 1987-20600
CA 1308630 A1 19921013 CA 1988-560077
                                                           19870302
                                                         19880229
                                                           19880302
                                          JP 1988-49453
                     A2 19880930
     JP 63235454
                                                           19880302
                                          BR 1988-903
                          19881011
                     A
     BR 8800903
PRAI US 1987-20600 19870302
     The Al-Li alloys for sheets or plates showing a good
     formability without Luder's line defect contain Li 0.5-4.0,
     {\tt Cu} and {\tt Mg} .ltoreq.5.0 each, {\tt Zr} .ltoreq.1.0, {\tt Mn}
     .ltoreq.2.0, Zn .ltoreq.7.0, Fe and Si .ltoreq.0.5% each, and preferably
     .ltoreq.0.35% impurities. A flat-rolled product is soln. heat treated
     quenched; preaged at 150-270.degree.F for >6 h; stretched without forming
and
     the Luder's line defect; and then aged to stabilize mech. properties.
     Thus, cast alloy ingot (contg. Li 2.3, Cu 2.7, and Zr
     0.1%) was heated for 24 h at 1000.degree.F for homogenizing, hot-rolled
     0.162 in. thickness, cut, and cold-rolled into strips 0.063 in. thick.
 to
     The strips were heated for 60 min at 1020.degree.F, quenched in water,
     preaged at 230.degree.F for 100 h, and cooled in air. The strips were
      then stretched 1% without showing the Luder's line defect. Without the
      preaging treatment the stretched strips showed the defect.
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Examine's Copy

90:126079 HCA ΑN

Aluminum alloy with improved weldability TΙ

Sperry, Philip R.; Mandigo, Frank N. ΙN

Swiss Aluminium Ltd., Switz. PA

Ger. Offen., 17 pp.

CODEN: GWXXBX

Patent DT

German LA

FAN CNT 2

SO

FAN.	CNT 2 PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PATENT NO.					
	DE 2810932 US 4094705	A1 A	19781012 19780613	DE 1970-2010332	19780314 19770328

19770328 PRAI US 1977-781718

High-strength formable Al alloy [69508-78-7] suitable for resistance welding contains Mg 2-4, Li 0.4-0.8, Mn 0.1-0.7, Fe .ltoreq.0.45, Si .ltoreq.0.45, Cu .ltoreq.10.2, Cr .ltoreq.0.4, Ti 0.1-0.2, Zn .ltoreq.0.3, Ni .ltoreq.0.3, V 0.05-0.15 and Zr .ltoreq.0.15%. The alloy contains Li in solid soln. and shows higher elec. resistance than Li-free alloys when rolled to sheet and annealed.

Examples Copy

```
116:260506 HCA
AΝ
    Two-step aging of aluminum-lithium alloys
ΤI
    Rioja, Roberto J.; James, R. Steve
Ili
    Aluminum Co. of America, USA
PΑ
     U.S., 10 pp.
SO
     CODEN: USXXAM
     Patent
DT
    English
LА
                                         APPLICATION NO. DATE
FAN.CNT 1
                    KIND DATE
     PATENT NO.
     US 5076859 A 19911231 US 1989-457099
                                                            19891226
     The soln. treated articles from Al-Li alloys are aged
     in the 1st stage for 0.1-100 h at 250-415 .degree.\hat{F}, and then in the 2nd
     stage (esp. for 1-1000 h) at 100-330 .degree.\tilde{F} for improved strength and
     fracture toughness. The heat treatment process is suitable for the
     Al alloys contg.: (a) Li 0.2-5.0, Mg 0-5.0,
     Cu .ltoreq. 5.0, Ag 0-2, Zr 0-1.0, Mn 0-1.0, Zn 0-9.0, Fe .ltoreq.
     0.5, and/or Si .ltoreq. 0.5\%; or (b) Li 0.5-4.0, Mg
     0.1-6.0, cu .gtoreq. 0.6, Zn 0.05-12, Mn 0-0.8, Zr .ltoreq.
     0.15, Ag 0.05-1, Fe .ltoreq. 0.5, and/or Si .ltoreq. 0.5%. Thus, the
     strip specimens from AA 2090 alloy were aged at 300-310 .degree.F and
     at 212-250 .degree.F, and showed high fracture toughness insensitive to
 then
     the tensile yield strength of 72-80 kpsi. When the alloy was aged only
      325 .degree.F, the fracture toughness decreased with the higher yield
 at
      strength of 70-77 kpsi.
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Elum ... Com

```
Aluminum-lithium alloys and method of making the same
NA
TΙ
    Cho, Chul Won
IN
    Aluminum Co. of America, USA
PA
    PCT Int. Appl., 46 pp.
SO
    CODEN: PIXXD2
    Patent
DT
    English
LΑ
                                       APPLICATION NO. DATE
FAN.CNT 8
                    KIND DATE
                                        _____
     PATENT NO.
                          _____
                    ____
                                       WO 1986-US2545 19861119
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                          19870521
                    A1
     WO 8703011
PΙ
       W: AU, BR, JP, NO
      RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE
                   A 19890221 US 1985-793273
                                                        19851119
                                        AU 1987-68381 19861119
     US 4806174\
                         19870602
                     Α1
                                                        19861119
     AU 8768381
                                        BR 1986-6987
                          19871201
                                       EP 1987-900418 19861119
                     A
     BR 8606987
                         19871202
     EP 247181
                     A1
                         19911002
                    В1
     EP 247181
        R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE
                                    JP 1987-500396
                                                        19861119
                    T2 19880728
     JP 63501883
                                                         19861119
                                        CA 1986-523324
                     Al 19910430
                                                         19870717
     CA 1283565
                                        NO 1987-2996
                           19870917
                     A
     NO 8702996
                    19851119
 PRAI US 1985-793273
                    19840329
     US 1984-594344
     The low-d. alloys suitable for aircraft applications contain Li
                    19861119
     0.5-4.0, Mg 0-5.0, Cu <5.0, Zr 0-1.0, Mn 0-2.0, Zn
 AB
     0-7.0, and Fe and Si .ltoreq.0.5% each. A wrought product having an
     isotropic texture is manufd. by hot working into a preform without a
     dissoln. loss of grain-boundary ppts., followed by recrystn. of the
      preform and hot working for final shaping. The alloy is suitable for
      sheet manuf. and pptn. hardening. Thus, a cast ingot of Al
      alloy (contg. Li 1.73, Cu 2.63, and Zr 0.12%) was
      soaked 24 h at 1000.degree. F, and then hot-rolled into a plate
      (.apprx.0.25 in). The plate was soln.-treated 1 h at 1075.degree. F,
      quenched in water to 70.degree. F, and stretched for 2 or 6% elongation.
      Plate specimens were then heat-treated at 325 or 375.degree. F for
      artificial aging. Fracture toughness and tensile strength were improved
      more by stretch-forming for 6% than for 2%.
```

gness low

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104:23136 HCA
NA
     Aluminum-lithium alloys
     Sawtell, Ralph R.; Bretz, Philip E.; Hunt, Warren H.
TI
IN
     Aluminum Co. of America, USA
PΑ
     Eur. Pat. Appl., 23 pp.
SO
     CODEN: EPXXDW
     Patent
DT
     English
LΑ
FAN.CNT 8
                                           APPLICATION NO. DATE
                     KIND DATE
     PATENT NO.
                                            -----
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                                           EP 1985-302169 19850328
                     A2 19851009
     EP 157600
PΙ
                      A3 19870916
     EP 157600
                      B1 19920701
     EP 157600
        R: CH, DE, FR, GB, IT, LI, NL, SE
                                       US 1984-594344
                                                              19840329
     US 4648913\ A 19870310
                                                              19850125
                                           AU 1985-33094
     AU 573683 B2 19880616
CA 1228490 A1 19871027
NO 8501267 A 19850930
BR 8501422 A 19851126
JP 60221543 A2 19851106
US 4897126 A 19900130
US 5135713
                                           CA 1985-475903 19850307
                           1985-1267
BR 1985-1422
19851106
19900130
19920804
US 1990-500410
10329
                                                              19850328
                                           NO 1985-1267
                                                             19850328
                                                              19850329
                                                               19880630
                                           US 1990-588410 19900926
                       19840329
 PRAI US 1984-594344
                       19841224
      US 1984-685731
                       19880128
      US 1988-149802
      High toughness in combination with tensile strength is obtained in
      aircraft alloys contg. Li 0.5-4, Mg 0-5.0, Cu
      0-5.0, Zr 0-1.0, Mn 0-2.0, Zn 0-7, Fe <0.5, and Si <0.5%. The wrought
      or strip is soln.-treated, quenched, stretched >3%, and aged at
 bar
      150-400.degree.F. Tensile strength of 50-85 kpsi is typically achieved
      with fracture toughness 25-75 kpsi-in0.5. Thus, Al alloy ingot
      contg. Li 1.73, Cu 2.63, and Zr 0.12% was homogenized
      24 h at 1000.degree.F, and hot-rolled into plates 1 in. thick. The plate
      was soln. heat treated 1 h at 1025.degree.F, quenched in water at
      70.degree.F, stretched 2 or 6%, and aged at 325 or 375.degree.F. Tensile
      strength and fracture toughness were higher after stretching to 6%,
       compared with 2%.
```

Exercine 3 Car

```
Aluminum-scandium alloys for welding rods and welded
    124:124235 HCA
AN
TI
     construction
     Tack, William Troy; Hansson, Inge L. H.
IN
     Ashurst Corp., USA
PΑ
     PCT Int. Appl., 139 pp
SO
     CODEN: PIXXD2
     Patent
DT
     English
LΑ
                                          APPLICATION NO. DATE
FAN.CNT 2
                     KIND DATE
     PATENT NO.
                                           _____
     -----
                                          WO 1995-US6684 19950524
                            19951130
                      A2
     WO 9532074
ΡI
         W: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD,
                      A3 19960314
     WO 9532074
             MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ,
         RW: KE, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT,
             LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE,
              SN, TD, TG
                                                             19950327
                                            US 1995-410801
                             19970415
                       Д
                                                             19950524
     US 5620652
                                            AU 1995-26515
                             19951218
     AU 9526515
                        A1
                                                             19950524
                                            EP 1995-921434
          R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT,
      EP 760727
                                                              19950524
                                            JP 1995-530546
 SE
                             19980526
                        T2
                                                              19961121
      JP 10505282
                                            NO 1996-4958
                            19970114
                        Α
      NO 9604958
                       19940525
 PRAI US 1994-249023
                       19950327
      US 1995-410801
                      19950524
      The Ce-contg. alloys with .gtoreq.60% Al are suitable for
      welding rods and welded construction, and typically contain Sc 0.02-10.0
 AB
      (esp. 0.1-0.5) and Zr 0.05-0.22%. The welding process is suitable for
      manuf. of bicycle frames from tubular preforms. The typical Al
      alloys for structural applications contain Cu 1.5-3.1,
      Mg 1.0-2.1, Fe 0.5-1.7, Ni 0.6-1.5, Ti 0.04-0.10, Si 0.10-0.25, Sc
      0.02-10.0, and Zr 0.1-1.0%. The Al alloys with Li
      typically contain Cu 3.5-5.5, Li 0.40-2.0, Ag
      0.01-0.80, Mg 0.01-1.5, Sc 0.02-0.5, and Zr 0.0-1.0%. The
      Al alloys with Zn typically contain Zn 4.0-9.0, Mg
       0.6-3.8, cu 0.1-3.0, Sc 0.02-10.0, and optionally Zr 0.0-1.0%.
       The alloys are suitable for structural applications in transportation and
       sport-oriented equipment.
```

George. Cog

Manufacture of high-strength **aluminum** alloy without solution NATItreatment

Uno, Teruo; Hirano, Seiichi IN

Sumitomo Light Metal Industries, Ltd., Japan PΑ

Jpn. Kokai Tokkyo Koho, 6 pp. so CODEN: JKXXAF

Patent DT

DT LA	Japanese			APPLICATION NO.	DATE
FAN.	CNT 1 PATENT NO.	KIND	DATE		19870720
		A2	19890127		
L _	JP 01025954 JP 03066387	В4	1991101/	from a billet com 0, 2r 0 05-0.30, and	ntg.
AB	The Al alloy fo	0.5-4.0	Mn 0.05-1.0,	0, Zr 0.05-0.30, and h, heating at 450	/or V 0.05- -520.degree
	optional Cr 0.0	.550.de	gree. for 2-48	Zr 0.05-0.30, and h, heating at 450 and Thus	, a billet

5-0.30% by soaking at 520-550.degree. for 2-48 h, heating at 450-520.degree., extruding, air cooling, and artificially aging. Thus, a billet of the Al alloy contg. Li 2.1, Cu 2.7, Si 0.04, Fe 0.05, Ti 0.02, B 0.002, and Be 0.0005% was soaked at 530.degree., heated 0.05, Ti 0.02, B 0.002, and Be 0.005% was soaked at 530.degree. at 480.degree., extruded into a rod, cooled, and aged at 175.degree. to show tensile strength 47.0 kg/mm2, yield point 40.1 kg/mm2, and

elongation

88.

Grander Lord

```
Crystallography of heterogeneous S' & T1 precipitates in double aged
TΙ
     Al-Cu-Mg-(Li) Alloys
     Teknik Egitim Fakultesi, Gazi Univ., Ankara, Turk.
ΑU
     Turk. J. Eng. Environ. Sci. (1996), 20(2), 103-12
CS
     CODEN: TJESÉC; ISSN: 1300-0160
SO
     Journal
DT
     Alloys prepd. with a chem. compn. of A1-2.11% Cu-0.93%
LΑ
     Mg (alloy-1) and A1-2.07%Cu-0.97%Mg
AΒ
     -0.87%Li (alloy-2) were subjected to homogenization,
     water-quenching, natural aging for 3.15 .times. 107s & artificial aging
     463K for 2.16 .times. 104s & 8.64 .times. 104s (double aging). Selected
      samples were examd. in detail under TEM. For this purpose, bright & dark
 аt
      field images together with electron diffraction patterns taken from
      [011], [012] & [111]A1-matrix directions were used. It was obsd. that
 [001],
      there was an effect of alloying elements, namely Li, Cu
      , \mathbf{M}\mathbf{g} on the nature & d. of lattice defects of dislocation loop
      type in Al-matrix during heat treatments. In alloy-2,
      Li & Cu atoms segregating on Frank & double-arc
      contrast, prismatic loops cause the formation of T1 (Al2CuLi) ppts.
      double aging; in alloys-1 & 2, Cu & Mg atoms
      segregating on unfaulted & orthorhombic, prismatic dislocation loops
 during
       the formation of heterogeneous S' (Al2CuMg) ppts. on these dislocation
  cause
       loops during the same heat treatment.
```

Exercine 3 Car

```
Aluminum-scandium alloys for welding rods and welded
ΑN
     Tack, William Troy; Hansson, Inge L. H.
IN
     Ashurst Corp., USA
      PCT Int. Appl., 139 pp
PA
      CODEN: PIXXD2
      Patent
DT
      English
                                                APPLICATION NO.
                                                                   DATE
 LA
 FAN.CNT 2
                                                                   _____
                         KIND DATE
                                                -----
                                                                    19950524
      PATENT NO.
                               _____
                                                WO 1995-US6684
                         ____
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           W: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ,
                                19951130
      WO 9532074
 ΡI
       WO 9532074
           RW: KE, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE,
                                                  US 1995-410801
                SN, TD, TG
                                                                     19950524
                                 19970415
                                                  AU 1995-26515
                                                                     19950524
        US 5620652
                                 19951218
                                                 EP 1995-921434
            R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT,
        AU 9526515
        EP 760727
                                                   JP 1995-530546
                                                                      19961121
                                  19980526
                                                  NO 1996-4958
   SE
                            T2
        JP 10505282
                                  19970114
                            A
        NO 9604958
                            19940525
   PRAI US 1994-249023
                            19950327
        The Ce-contg. alloys with .gtoreq.60% Al are suitable for
         US 1995-410801
         welding rods and welded construction, and typically contain Sc 0.02-10.0
         (esp. 0.1-0.5) and Zr 0.05-0.22%. The welding process is suitable for
   AB
         manuf. of bicycle frames from tubular preforms. The typical Al
         alloys for structural applications contain Cu 1.5-3.1,
         Mg 1.0-2.1, Fe 0.5-1.7, Ni 0.6-1.5, Ti 0.04-0.10, Si 0.10-0.25, Sc
         0.02-10.0, and Zr 0.1-1.0%. The Al alloys with Li
          typically contain Cu 3.5-5.5, Li 0.40-2.0, Ag
          0.01-0.80, Mg 0.01-1.5, Sc 0.02-0.5, and Zr 0.0-1.0%.
          Al alloys with Zn typically contain Zn 4.0-9.0, Mg
          0.6-3.8, Cu 0.1-3.0, Sc 0.02-10.0, and optionally Zr 0.0-1.0%.
          The alloys are suitable for structural applications in transportation and
          sport-oriented equipment.
```

Examine's Gorg

```
Aluminum-lithium-zinc alloys for extruded parts having
AΝ
    Witters, Jeffrey J.; Cheney, Brian A.; Rioja, Roberto J.
ΤI
     Aluminum Co. of America, USA
     PCT Int. Appl., 21 pp.
PΑ
SO
     CODEN: PIXXD2
     Patent
DT
                                            APPLICATION NO. DATE
     English
LΑ
 FAN.CNT 1
                      KIND DATE
                                            -----
     PATENT NO.
                                                             19911227
                            _____
                                            WO 1991-US9808
      -----
                             19920723
                       A1
          RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE
      WO 9212269
 PΙ
                                                            19901227
      US 5151136 A 19920929
                                                             19911227
                                            EP 1992-902697
      EP 517884
                                                             19911227
          R: DE, FR, GB
                                            JP 1992-502886
                            19930826
                        т2
       JP 05505854
                       19901227
  PRAI US 1990-634901
      The Al alloys having extruded length/thickness ratio of 1-2.5
       contain Li 0.2-5.0 and Zn 0.05-12.0 (esp. 0.05-1%) with
       Mg 0-5.0, Cu .ltoreq.6.5, Zr .ltoreq.1.0 Mn .ltoreq.2.0,
       Ag .ltoreq.2, Fe .ltoreq.0.5, and/or Si .ltoreq.0.5%. The preferred
       0.2-2.5, Zn 0.2-11.0, Zr 0.08-0.12, Mn 0-1.0, and Fe and Si impurities
       contains Li 1.5-3.0, Cu 2.55-2.90, Mg
       .ltoreq.0.1% each. The alloys optionally contain Cr, V, Sc, and/or Ti at
       0.05-0.2, and/or Hf, Fe, Ni, Ag, and/or Mn at 0.05-0.6%. The starting alloy ingot can be preformed with .gtoreq.30% size redn., followed by
        treatment for 1-50 h at 400-1200.degree. prior to the extrusion stage.
        Tensile yield strength of the extrusions is .gtoreq.60 kpsi. Thus, the
        extruded billet was manufd. from the alloy contg. Li 2.17,
        Cu 2.79, Zn 0.49, Mg 0.25, Zr 0.07, Mn 0.35, and V
        0.08%. After thermomech. treatment and final aging (30 h at 310
        .degree.F), tensile strength was 78 kpsi, yield point 71.2 kpsi, and
        elongation 6.8%. Com. AA 2091 Al alloy after the same
         processing showed 70 kpsi, 69.4 kpsi, and 1.6% resp.
```

Examine's Gyr

AN 90:126079 HCA

TI Aluminum alloy with improved weldability
IN Sperry, Philip R.; Mandigo, Frank N.

PA Swiss Aluminium Ltd., Switz.

SO Ger. Offen., 17 pp.

CODEN: GWXXBX

DT Patent

LA German

DN CNT 2

FAN. CNT 2

PATENT NO.

DE 2810932

US 4094705

PATENT US 1977-781718

PAPPLICATION NO. DATE

APPLICATION NO. DATE

DE 1978-2810932 19780314

US 1977-781718 19770328

PRAI US 1977-781718 19770328

High-strength formable A1 alloy [69508-78-7] suitable

High-strength formable A1 alloy [0.4-0.8, Mn for resistance welding contains Mg 2-4, Li 0.4-0.8, Mn for resistance welding contains Mg 1.1toreq.0.4, Cu .1toreq.0.4, Cu .1toreq.0.4, Cu .1toreq.0.3, V 0.05-0.15 and .1toreq.0.4, Ti 0.1-0.2, Zn .1toreq.0.3, Ni .1toreq.0.3, V 0.05-0.15 and 2r .1toreq.0.15%. The alloy contains Li in solid soln. and shows higher elec. resistance than Li-free alloys when rolled to sheet and annealed.

110:235863 HCA Manufacture of high-strength aluminum alloy without solution AN TItreatment Uno, Teruo; Hirano, Seiichi IN Sumitomo Light Metal Industries, Ltd., Japan PAJpn. Kokai Tokkyo Koho, 6 pp. SO CODEN: JKXXAF Patent DTJapanese LA FAN.CNT 1 APPLICATION NO. DATE KIND DATE PATENT NO. _____ ______ JP 01025954 A2 19890127 JP 03066387 B4 19911017 JP 1987-178850 19870720 PΙ The Al alloy for aircraft is manufd. from a billet contg. AB Cu 0.5-5.0, Li 0.5-4.0, Mg 0, 0.5-6.0, optional Cr 0.05-0.30, Mn 0.05-1.0, Zr 0.05-0.30, and/or V 0.05-0.30% by soaking at 520-550.degree. for 2-48 h, heating at 450-520.degree., extruding, air cooling, and artificially aging. Thus, a billet of the Al alloy contg. Li 2.1, Cu 2.7, Si 0.04, Fe 0.05, Ti 0.02, B 0.002, and Be 0.0005% was soaked at 530.degree., heated at 480.degree., extruded into a rod, cooled, and aged at 175.degree. to show tensile strength 47.0 kg/mm2, yield point 40.1 kg/mm2, and elongation 8%.

(ow Ty